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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,680	04/19/2007	Hidehiro Iida	0020-5520PUS1	2200
2292 7590 03/23/2010 BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747				
EXAMINER ALEMU, EPHREM				
ART UNIT 2821		PAPER NUMBER		
NOTIFICATION DATE 03/23/2010		DELIVERY MODE ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

### Office Action Summary

**Application No.**

10/594,680

**Applicant(s)**

IIDA ET AL.

**Examiner**

Ephrem Alemu

**Art Unit**

2821

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 September 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7 and 11-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 11-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-510/510a)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Paper No(s)/Mail Date \_\_\_\_\_
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Specification***

1. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### ***Claim Objections***

2. Claim 4 is objected to because of the following informalities: in claim 4, "the accelerated deuteron" lacks antecedent basis. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 14 and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claims 14 and 15, the recitation "wherein dose equivalent of neutrons for a deuteron beam of energy of 3.5 MeV of the material is equal to or smaller than  $2.5 \times 10^{-1}$  Sv/h/ $\mu$ A/sr ( $2.5 \times 10^{-2}$  Sv/h/ $\mu$ A/sr)" is not clear. What are "dose equivalent of neutrons for a deuteron beam of energy of 3.5 MeV of the material" and "Sv/h/ $\mu$ A/sr" are referring to? How is the dose equivalent of neutrons for a deuteron beam of energy of 3.5 MeV of the material determined? The claim is vague and indefinite in which the scope of the claim could not be determined. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 2 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by L. H. Thomas (US 3,348,089).

Re claims 1 and 2, Thomas discloses a particle beam accelerator comprising: a vacuum chamber (2); a magnet (1, 3) which generates a constant magnetic field in the vacuum chamber (2); acceleration electrodes (9, 10) which generates a magnetic field in a direction perpendicular to the direction of the magnetic field generated by the magnet (1, 3) in the vacuum chamber (2); and an extraction electrode (20) which extracts charged particles accelerated in the vacuum chamber (2); wherein at least a part of surfaces (i.e., septum 28) exposed to the charged particles of the vacuum chamber, the acceleration electrodes (9, 10), and/or the extraction electrode (20) is made of a material including an element having atomic number larger than copper (i.e., tungsten) (Figs 1-3; see descriptions related to the figures; wherein the particle beam accelerator is a cyclotron (Fig. 1; Title), and the at least a part of the surfaces exposed to the charged particles comprises surfaces (i.e., septum 28), arranged along the circular orbit (Fig. 3), of the charged particles of structural components including the vacuum chamber, said acceleration electrodes, and said extraction electrode).

Re claim 18, Thomas further shows a target cell being positioned at a position at which the charged particles extracted by the extraction electrode (20) strike (Fig. 3).

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 3, is rejected under 35 U.S.C. 103(a) as being unpatentable over L. H. Thomas (US 3,348,089) in view of Hudson (US 4,055,782).

Re claim 3, Thomas does not mention the at least a part of the surfaces exposed to the charged particles of the vacuum chamber, the acceleration electrodes, and/or the extraction electrode being covered by a sheet of the material.

In the same field of endeavor, Hudson teaches covering at least a part of the surfaces exposed to the charged particles of the vacuum chamber, the acceleration electrodes, and/or the extraction electrode of a cyclotron with a sheet of material including an element (7) having atomic number larger than copper (i.e., tantalum) for the purpose of withdrawing ions from the arc chamber by means of an accelerating electrode in a conventional manner (Fig. 1; abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide covering for at least a part of the surfaces exposed to the charged particles of the vacuum chamber, the acceleration electrodes, and/or the extraction electrode of a cyclotron with a sheet of material including an element having atomic number larger than copper for the purpose of reducing the low energy neutron flux.

9. Claims 4-7 and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over L. H. Thomas (US 3,348,089) in view of Hudson (US 4,055,782) further in view of Bigham et al. (US 3,925,676).

Re claims 4 and 7, Bigham or Hudson does not teach if the sheet of the material is thick enough to stop the accelerated deuteron therein.

In the same field of endeavor, Bigham teaches of providing a sheet of material including an element having atomic number larger than copper (i.e., gold) having a thickness (i.e., 1 mm) for stopping the deuterons therein for the purpose of reducing the low energy neutron flux (Fig. 6; Col. 4, lines 17-20).

Therefore, providing a sheet of material including an element having atomic number larger than copper (i.e., gold) having a thickness for the cyclotron of Thomas modified by Hudson deemed to be obvious for stopping the deuterons therein as taught by Bigham for the purpose of reducing the low energy neutron flux.

Re claims 5 and 6, given Thomas modified by Hudson further modified by Bigham cyclotron, the at least a part of the surfaces exposed to the charged particles comprising a plating layer (coating film) including the material deemed to be within routine skill of an artisan for no other reason than reducing the low energy neutron flux.

Re claim 11, given Thomas modified by Hudson further modified by Bigham cyclotron, positioning a structural element made of the material arranged in an area not including the electrodes for the resonator or in the valley of the poles of the electromagnet to block a part of the beam would have been obvious so as to provide neutron shielding in the forwardly direction from the target.

Re claims 12 and 13, given Thomas modified by Hudson further modified by Bigham cyclotron, positioning a heater at one of the components arranged in the vacuum chamber for heating the one of the components and providing an instrument in the vacuum chamber, for

measuring a current of the accelerated beam, wherein the at least a part of the surfaces exposed to the charged particles comprises a surface of the instrument facing the beam would have been deemed obvious for no other reason than confining the neutron irradiation as much as possible to the intended neutron beam path.

10. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over L. H. Thomas (US 3,348,089) in view of Nunan (US 4,112,306).

Re claim 16, although, Thomas teaches the target cell being separated from the other components in the particle beam accelerator, Thomas does not explicitly teaches a shielding wall for shielding radioactive rays generated in the target cell is provided around the target cell.

In the same field of endeavor, Nunan teaches providing around a target cell (53) a shielding wall (55) for shielding radioactive rays generated in the target cell (53) for the purpose of inhibiting undesired spurious neutron radiation to confine the neutron irradiation as much as possible to the intended neutron beam path (21) (Fig. 5; Col. 5, lines 27-34).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide around a target cell of Thomas a shielding wall for shielding radioactive rays generated in the target cell as taught by Nunan for the purpose of inhibiting undesired spurious neutron radiation to confine the neutron irradiation as much as possible to the intended neutron beam path

Re claim 17, Nunan further shows a synthesis apparatus (i.e., radiotherapy treatment for patient) which receives a substance generated in the target cell as a starting material, the synthesis apparatus (i.e., radiotherapy treatment for patient) being integrated as a unit with the target cell (53) (Figs. 1-4; Col. 6, lines 8-36).

***Conclusion***

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Janzow (US 6,441,569); Hendry et al. (US 3,725,709); C. Frondel (US 2,437,915); teach similar inventive subject matter.

***Correspondence***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ephrem Alemu whose telephone number is (571) 272-1818. The examiner can normally be reached on M-F 9:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Douglas W Owens can be reached on (571) 272-1662. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

EA  
3-13-10

/Douglas W Owens/  
Supervisory Patent Examiner, Art Unit 2821  
March 15, 2010